Egyptian Herbal Monograph

Volume 1

Traditional wild medicinal plants

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***Capparis spinosa* L.** كبار- لصف

1. Names & Synonyms (1-3)

***Capparis spinosa* L.**

Family: Capparaceae.

Arabic: Kabbar كبار, Lasaf لصف, Laisouf ليصوف.

English: Common caper-bush.

2. Geographical distribution (1-3)

Deserts, Oases, and Sinai (Saint Catherine).

Four varieties occur in Egypt (1,3):

1) Var. ***spinosa***
Syns. *Capparis aegyptia* Lam.

Capparis spinosa L. var. *aegyptia* Lam. Boiss.

The oases of the Western Desert, all the deserts of the country as well as the Sinai Peninsula.

2) Var. ***canescens*** Coss.
Syns. *Capparis ovata* Desf.

Capparis sicula Duh.

Capparis leucophylla DC.

The oases of the Western Desert as well as Desert east of the Nile including that of Sinai.

3) Var. ***inermis*** Turra.
Syns. *Capparis orientalis* Duh.

Capparis rupestris Sibth. & Sm.

Capparis spinosa L. var. rupestris (Sibth. & Sm).

Capparis spinosa L. subsp. orientalis (Duh.).

Confined to the maritime cliffs of the Mediterranean coastal strip.

4) Var*. **deserti*** Zohary*.*

Syn. *Capparis deserti* Zohary Tàckh. & Boulos, publ.

Desert west of the Nile (North of Siwa Oasis).

3. Parts used for medicinal purposes (3)

Capers (flower buds), Caper berries (fruits), roots, seeds and leaves.

4. Major chemical constituents (3)

- Alkaloids:

Capparisines A, B and C, and others (fruits) (4).

Tetrahydroquinoline acid (stems and fruits) (5).

Modified amino acid or alkaloid (fruits) (6).

Stachydrine and cadabicin (fruits, flowers and flower buds) (7).

Spermidine alkaloids; capparispine, capparispine 26-O-β-D-glucoside and cadabicine 26-O-β-D-glucoside hydrochloride (roots) (8).

- Flavonoids:

C. spinosa is considered as an economical source of quercetin and rutin.

Quercetin (buds) (9), and various derivatives of its glycosides (fruits and other parts of the plant) (10). The quercetin derivative aglycone, isorhamnetin and its rutinoside glycoside (Leaves and flower buds) (11).

kaempferol and its glycosides are minor constituents from the fruits and buds (12, 13).

Other flavonoids and various classes of flavonoid sub-groups are represented in *C. spinosa*: ginkgetin, isoginkgetin chrysoeriol, apigenin, flavanone derivative (Sakuranetin), flavones (twogonin and oroxylin A, thevetiaflavone) (12, 14-18).

-Glucosinolates:

Glucocapparin, glucoiperin, glucobrassicin, neoglucobrassicin and 4-methoxy-glucobrassicin (19, 20).

-Seeds Oil:

The major constituents are linoleic and oleic acids followed by palmitic and other fatty acids (21, 22).

Approximately 145 chemical substances have been identified. Among them are aldehydes, esters, sulfur containing compounds monoterpenes, capric acid and sesquiterpenes (23, 24).

- Essential Oil:

Essential oil extracted from leaves, fruits and roots; the major components are thymol, methyl isothiocyanate, isopropyl isothiocyanate, butyl isothiocyanate, 2-hexenal (25).

- Other chemical constituents: Saponin, phenolic acids along with butanedioic acid, uracil and uridine, pentosans, indols, β-sitosterol and its glycoside (fruits) (6, 7, 16, 26, 27), benzofuranone enantiomers (fruits and stem) (5), triterpene, (28), β-carotene, ascorbic acid, phytic acid and oxalic acid (fruits) (29, 30).

5. Traditional medicinal uses (31)

***Oral:**

A. Renal System Diseases: Renal disinfectant and Diuretic.

B. Gastrointestinal System Diseases

1. Cholera.
2. Diarrhea.
3. Astringent.
4. Carminative, appetizer, laxative, purgative and anthelmintic.
5. Scurvy.

C. Respiratory System Diseases

1. Cough.
2. Chest disorders.
3. Expectorant.

D. Improving the sexual power

E. Gynecological diseases:

1. Treat feminine sterility and dysmenorrhea.
2. Emmenagogue.

F. Sciatica& back pain

G. Others:

1. Snake bites.
2. Febrifuge.
3. Treatment of chills.
4. Stimulant and tonic.
5. Gout.

***External:**

H. Rheumatism.
I. Ulcers, ganglions and scrofula.
J. Spleen troubles.

***C. spinosa* is a traditional medicinal plant for use in the specified indications exclusively based upon long-standing use.**

6. Herbal preparations correlated to medicinal use (31)

1) Oral decoction or infusion of different parts of the plant.

- **Infusion:**

Pour freshly boiled water on 2 teaspoonful of *C. spinosa* in a cup, cover the cup with the lid and infuse for 5 minutes. Drink it sweetened if desired.

- **Decoction:**

Pour cold water on 2 teaspoonful of *C. spinosa* and boil, simmer for 10 minutes. Pour into a cup and drink it sweetened if desired.

A. Flower buds and root.

B.

1. Decoction of leaves.
2. Infusion prepared from the stem and root bark.
3. Roots.
4. Leaves and fruits.
5. Root bark.
6. Fruits.

C.

1. Decoction of seeds.
2. - Decoction of leaves.
   - Bark.
3. Bark.

D.

1. Decoction of seeds.
2. Leaves and fruits.

E.

1. Seeds.
2. Root bark.

F.

- Infusion of fruits.
- Powdered fruits mixed with honey.

G.

1. Water extract of leaves.
2. Infusion prepared from the stem and root bark.
3. Flower buds and roots.
4. Flower buds.
5. Bark.

2) **Paste of root bark.**
3) **Crushed flower buds.**
4) **Cataplasm (poultice):**

Simmer the root bark for 2 minutes, squeeze out any excess liquid and apply it while hot. Bandage the herb securely in place using piece of cloth. Leave on for up to 3 hours, as required.

7. Posology and method of administration correlated to medicinal use (31)

Preparation 1
Indications A-G
- Drinking the decoction or infusion 3 cups/day.
- For snake bites: Leaves added to water and taken once.

***Method of administration:** Oral use.

Preparation 2

Indication H

Apply the paste of root bark on the area of the affected area 4 times/ day.

***Method of administration:** External use.

Preparation 3

Indication I

Flower buds are crushed and applied externally on the affected area.

***Method of administration:** External use.

Preparation 4

Indication J

Apply the cataplasm every 4 hours.

***Method of administration:** External use.

8. Contraindications

Hypersensitivity to active substances and to other plants of the same family.

9. Special warnings and precautions for use

- If the symptoms worsen during the use of the medicinal product, a doctor or a pharmacist should be consulted.
- Monitoring of blood glucose level should be done regularly (32).

10. Interactions with other medicinal products and other forms of interaction

None reported.

11. Fertility, pregnancy and lactation

- The use should be avoided during pregnancy (32).
- Safety during lactation has not been established. In the absence of sufficient data, the use during lactation is not recommended.
- It is traditionally used for improving the sexual power, as emmenagogue and to treat feminine sterility and dysmenorrhea (3, 31).

12. Effects on ability to drive and use machines

No studies on the effect on the ability to drive and use machines have been performed.

13. Undesirable effects

-If adverse reactions occur, a doctor or a pharmacist should be consulted.

-Topical use of *C. spinosa* may cause contact dermatitis (32).

14. Overdose

No case of overdose has been reported.

15. Relevant biological activities

- The aqueous extracts of the fresh leaves and flower buds of *Capparis spinosa* were assessed *in vitro* for their antioxidant potential effect and the anthelmintic efficacy. Both plant extracts (flower buds (IC50 = 2.76 mg/ml and leaves (IC50 = 8.54 mg/ml) showed ovicidal activity at all tested concentrations. The flower buds extract showed higher inhibitory effects than leaves extract in the egg hatching

assay as well as inhibition more worms. These results proved that *C. spinosa* possesses *in vitro* anthelmintic properties which may be related to its high content of phenolic compounds such as flavonoids and tannins (33).

- Different parts of caper were investigated for their antioxidant effects, potentially useful against some degenerative diseases (34).
- The effects of the hydroalcoholic extract of *Capparis spinosa* fruit, quercetin, and vitamin E on monosodium glutamate – induced toxicity in rats were compared. All chemicals were orally administered for 14 consecutive days. The histopathological and biochemical evaluations showed that *C. spinosa* fruit extract, quercetin and vitamin E can produce approximately similar protective effects on tissue function through oxidative stress alleviation and antioxidant mechanisms restoration (35).
- The anti-arthritic activity of *C. spinosa* L. (Capparidaceae) fruits different extracts was investigated on an arthritic rat model. The fraction eluted by ethanol/water (50:50, v/v) had the most significant anti-arthritic activity (36).
- The aqueous extract of the fruits of *C. spinosa* was evaluated for the anti-inflammatory activity in carrageenan induced paw edema in mice (37). Different fractions separated from the aqueous extract were orally administrated to male Chinese (KM) mice. The anti-inflammatory effects exhibited by these fractions were compared with those of indomethacin used as positive control. Some fractions at 50 and 250mg/kg at 6h after induction inhibited the edema in mice in a dose-dependent manner.
- Several flavonoids and bioflavonoids were isolated from the fruits of *C. spinosa* and evaluated for their effects on NF-kB activation through a secreted placental alkaline phosphatase reporter assay. The isolated biflavonoid ginkgetin showed strong inhibitory effects on NF-kB activation with an IC50 value of 7.5 μM (15).
- The ability of *C. spinosa* L. preparation to orientate, *in vivo*, the immune response mediated by CD4+ T-cells towards an anti-inflammatory response was assessed. The obtained data indicated that *C. spinosa* regulates inflammation induced in mice *in vivo* and thus could be a source of anti-inflammatory molecules, which could be used in some T lymphocyte-dependent inflammatory diseases (38).
- The methanolic extract obtained from the fruits of *C. spinosa* was assayed for antiquorum sensing activity in *Chromobacterium violaceum* and *P. aeruginosa,* and for antibiofilm formation in *E. coli*, *Proteus mirabilis*, *S. marcescens* and *P. aeruginosa* (39). The results conducted that the fruits of *C. spinosa* showed a promising potential to be exploited in the treatment of emerging infections of antibiotic resistant bacterial pathogens.
- Caper was studied as a possible enhancer of bone regeneration (40). Ethanolic extract of *Caper* buds was administered at 20mg/kg b.w. to male Wistar albino rats, with maxillary incisions from applied springs. Results showed that the

administration of Caper extract accelerated osteoblastic activity in the early period.

- The methanolic extract of *C. spinosa* buds, rich in flavonoids such as quercetin and kaempferol derivatives, was proven to exert *in vitro* immunomodulatory effects in human peripheral blood mononuclear cells (23). In particular, the administration of extract inhibited the herpes simplex virus type 2.
- *In vitro* and *in vivo* studies on the methanolic extracts of leaves and fruits of *C. spinosa* confirmed the immunomodulatory activity (41). The methanolic extracts at 400μg/mL showed significant increases in the proliferation of cells in the presence of the mitogen concanavalin A (10μg/mL). In cyclophosphamide-treated and myelosuppressed Wistar mice, the administration of 100 and 200mg/kg b.w. of both methanolic extracts increased significantly the level of the total white blood cells.
- The relaxant effects of the aqueous extract of *C. spinosa* fruits were demonstrated on rat trachea in a dose dependent manner (42). Wistar rat trachea was excised and contracted with acetylcholine. At 1 and 10mg/mL the *Caper* fruit aqueous extract had a relaxant effect on acetylcholine precontracted trachea. On the other hand, leaf and seed extracts gave contractile effects (42). These results may be helpful in supporting the use of Caper extract in the treatment of asthmatic patients.
- The effects of *C. spinosa* as antihepatotoxic on rats against paracetamol and carbontetrachloride induced toxicity *in vivo* was evaluated, in addition to its effect on galactosamine and thioacetamide induced toxicities *in vitro*. The methanol soluble fraction of the aqueous extract of aerial parts of *C. spinosa* was reported to exhibit significant anti-hepatotoxic activity (27).
- Protective action of *C. spinosa* ethanolic root bark extract was evaluated in this study in an animal model of hepatotoxicity, which was induced by carbon tetrachloride. The results revealed that ethanolic root bark extract of *C. spinosa* could afford significant dose-dependent protection against CCl4 induced hepatocellular injury (43).
- Examination of the acute and sub-chronic toxicity of hydro-alcoholic extract of the *C. spinosa* on the liver, kidney, and serum enzymes were done. The doses of 200, 400 and 800mg/kg of hydro-alcoholic extract of *C. spinosa* were administrated by oral gavages for 28 consecutive days in mice. The results have shown that *C. spinosa* can cause nephrotoxicity and hepatotoxicity especially during sub-chronic consumption, dose-dependently. The extracts of *C. spinosa* must be used with caution especially in renal and liver pathologic conditions (44).
- The protective effects of the hydroalcoholic extract of *C. spinosa* L. on Cyclophosphamide-induced nephrotoxicity were evaluated. Different plant parts

(fruit, leaves, and petals) were examined for antioxidant activity by DPPH assay. The results indicate that *C. spinosa* extract ameliorates biochemical indices and oxidative stress parameters against Cyclophosphamide – induced nephrotoxicity (45).

- The antioxidant, nephroprotective and hepatoprotective effects of methanolic extract of *C. spinosa* leaves were studied. The methanolic extract showed interesting antioxidant capacity. This study supports the traditionally use of *C. spinosa* to cure kidney and liver diseases (46).
- *C. spinosa* L. has the potential to down regulate inflammation – involved genes in Alzheimer's disease (AD) due to its high levels of flavonoids and could be beneficial as a dietary complement in AD patients (47)

16. Additional Information

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17. Date of compilation/last revision

06/08/2022.

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